

# ABSTRACT:

A process and an arrangement are described by means of which it is possible to generate a layer system for the protection against wear, for the protection against corrosion and for improving the sliding properties or the like, which has an adhesive layer for the arrangement on a substrate, a transition layer for the arrangement on the adhesive layer and a cover layer of an adamantine carbon, the adhesive layer comprising at least one element from the Group which contains the elements of the 4th, 5th and 6th Subgroup and silicon, the transition layer comprising carbon and at least one element from the above-mentioned Group, and the cover layer consisting essentially of adamantine carbon, the layer system having a hardness of at least 15 GPa, preferably at least 20 GPa, and an adhesion of at least 3 HF according to VDI 3824, Page 4.

For producing such a layer, a process is used during which, after the substrate is placed in a vacuum chamber and after a pumping-down to a vacuum of less than  $10^{-4}$  mbar, preferably  $10^{-5}$ , the substrate surface is first cleaned in that adhering impurities are removed, while subsequently a plasma-aided vapor depositing of the adhesive layer takes place. Then the transition layer is applied by the simultaneous plasma-aided vapor depositing of the adhesive layer constituents and the depositing of carbon from the gas phase by means of plasma CVD.

The application of the adamantine carbon layer then takes place by way of the sole plasma-aided depositing of carbon from the gas phase. During the process, a substrate bias voltage is applied to the substrate which is preferably pulsed in a medium frequency range, and a magnetic field is superimposed which stabilizes the plasma in individual process steps.

A corresponding arrangement for implementing the coating process therefore has a vacuum chamber (1) with a pumping system (9) for generating a vacuum in the vacuum chamber, substrate holding devices (3) for receiving the substrates to be coated, at least one gas supply unit (18) for the metered addition of process gas, at least one vaporizer device (14) for providing coating material for the vapor depositing, an arc generating device (10, 13) for igniting a direct-voltage low-voltage arc, a device (16) for generating a substrate bias voltage, and at least one or several magnetic field generating devices (17) for forming a magnetic far field and/or several close fields.

(Figure 1)

### Translation of Figure 3

Substratstrom	=	substrate current
Spulenstrom	=	coil current

### Translation of Figure 4

Fluss	=	flow
Pulsspannung	=	pulse voltage
Leistung	=	power

### Translation of Figure 6

Gradientenschicht	=	gradient layer
Substrat	=	substrate
Querbruchaufnahme einer erfindungsgemäß hergestellten Schicht	=	Cross Fraction Photo of a Layer Produced according to the Invention